

Appl. No. 10/709,651
Amdt. dated July 12, 2005
Reply to Office action of March 18, 2005

REMARKS/ARGUMENTS

Claims 1-3, 5, 7-12, 14, 15, and 18 are rejected under 35 U.S.C. 103(a). Claims 3 and 16 are rejected under 35 U.S.C. 103(a). Claim 10 is rejected under 35 U.S.C. 103(a).
5 Claims 4, 6, 13, and 17 are allowable subjects.

1. Informalities:

(1) Correction of specification:

10 Para. [0022] has been amended as shown in the "Amendments to the Specification" section to add the symbol " φ " for designating the angle shown in Fig.3. The Applicant believes the mistake of the symbol form resulted from a format transformation and thanks for the correction of the Examiner. Acceptance of the corrected specification is politely requested.

(2) Correction of claim:

15 Claim 14 is corrected to replace "a space of the straight lines" by "a space between the straight lines" for grammar correction. Therefore, acceptance of the amended claim 14 and its dependent claim 15 is requested.

2. Rejections of claims 1, 2, 5, 7-9, 11, 12, 14, 15, and 18 under 35 U.S.C. 103(a):

20 Claims 1, 2, 5, 7-9, 11, 12, 14, 15, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang (U.S. Publish Patent Application No.2005/0026047 A1) in view of either Robles et al. (U.S. Publish Patent Application No.2004/005089 A1), or Nocha et al. (U.S. Publish Patent Application No.2004/0229133 A1), or Hsu et al. (U.S. Publish Patent Application No.2005/0028129 A1) for reasons of record, as
25 recited on pages 3-4 of the above-indicated Office action.

Response:

(1) Claim 1:

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5 Claims 1 and 8 are amended to more clearly describe the characteristics of this application. No new matters are entered. According to the amended claim 1 of this application, a main characteristic of the method of this application is to add pluralities *square* geometric patterns with the same sizes between two line patterns of the photomask layout, and *the square geometric patterns arranges as a line that is parallel with the two line patterns.*

10 Regarding Yang's application, he teaches forming a group of assist features 90 in two line-shaped features 52, wherein width 98 is larger than the length 94 of the assist features 90 so that each of the assist features 90 are rectangular (Fig.8, para. 0039, lines 16-20). Therefore, Yang is silent about teaching forming square assist features between two line-shaped features.

15 The Examiner mentioned Yu discloses forming square assist features 504a-504h in Fig.5A and column 5, lines 16-26. However, referring to Fig.5A and column 5, lines 26-32, Yu describes "The assist features of Figs.5A and 5B are preferably arranged in a symmetrical and/or a regular pattern around the non-dense contact 502. For instance, the assist features of Fig.5A are arranged octagonally near and around the contact 502, ..." Therefore, Yu only teaches arranging the square assist features
20 504a-504h around the contact pattern 52 as a circle to encompass the contact pattern 52, but never teaches arranging the square assist features 504a-504h as a line near the square contact pattern 52 or near a line-shaped pattern. Furthermore, Yu never teaches arranging the square assist features 504a-504h as a parallel with a line-shaped pattern, neither.

25 MPEP 706.02(j) explains very clearly that three criteria must be met to sustain an obviousness-type rejection: (1) there must be some sort of motivation to combine the references, (2) there must be a reasonable expectation of success, and (3) all claim

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limitations must be met. Since Yang never teaches to use square assist patterns in a photomask that has line-shaped patterns and Yu never suggests arranging square assist patterns in a line near a line-shaped pattern for improving the lithography effect of the line-shaped pattern, the Applicant respectfully asserts that there is no sort of motivation and reasonable expectation of success to combine the references of Yang and Yu. Therefore, the Applicant believes the amended claim 1 should be allowable. Accordingly, reconsideration of the amended claim 1 is politely requested.

(2) Claim 7, 12, and 18:

The filing date of the application of Hsu et al. is 2004/6/29, which is later than the filing date, 2004/5/19, of this application. Therefore, the application of Hsu et al is not a valid reference. Sequentially, claims 7, 12, and 18 that limit the wavelength in the OAI and adopt OPC process should be allowable.

(3) Claim 8:

According to the amended claim 8, this application contains two main characteristics:

A. *The assist patterns having a plurality of geometric patterns individually are added in two adjacent straight lines.*

B. *The width of the assist pattern is equal to the space between the straight line and the assist pattern.*

Referring to the cited reference, Yang only teaches providing an assist pattern 60 or 90 between adjacent line-shaped patterns 52 (Figs. 3(a), 3(b), 4 and 8). Furthermore, in Fig.3(a), the width 62 of the assist pattern 60 is larger than the space 74 between the assist pattern 60 and the adjacent line-shaped pattern 70, and in Fig.8, the width 98 is also larger than the space 92 between the assist

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pattern 90 and the adjacent line-shaped pattern 52. Therefore, *Yang never teaches to provide an assist pattern with a width equal to the spaces between the adjacent line-shaped patterns and the assist pattern, and never teaches to provide a plurality of assist patterns having geometric patterns arranging in a line individually in two adjacent line-shaped patterns.* Furthermore, Robles et al. do not teach any of the above mentioned two characteristics of this application, either. Therefore, the combination of the references of Yang and Robles et al. cannot obtain all the limitations of the amended claim 8 and the claim 8 should be allowable. Reconsideration of the amended claim 8 is thereby requested.

(4) Claims 2, 5, 7, 9, 11, 12, 14, 15, 18:

Since claims 2, 5, 7 are dependent upon claim 1 and claims 9, 11, 12, 14, 15, 18 are dependent upon claim 8, they should be allowable if the amended claims 1 and 8 are allowable. Reconsideration of claims 2, 5, 7, 9, 11, 12, 14, 15, 18 is therefore politely requested.

3. Rejections of Claims 3 and 16 under 35 U.S.C. 103(a):

Claims 3 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Robles et al., and further in view of Yu.

Response:

Claim 3 is canceled, thus no more consideration is needed. Claim 16 is dependent upon claim 8. Accordingly, claim 16 should be allowed if the amended claim 8 is allowable.

4. Rejection of Claim 10 under 35 U.S.C. 103(a):

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yang in view of Robles et al. and further in view of Smith (U.S. Patent Application Publication NO.

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2002/0192570).

Response:

According to claim 10 of this application, the *amount* and the width of the assist patterns added between any two of straight lines are determined according to a *numerical aperture (NA)* of a lens of the OAI. However, *none of the references of Yang, Robles et al, and Smith teach the amount of the assist patterns in two straight lines is determined according to the NA of the lens of OAI.* Therefore, the claim 10 should be allowable. Furthermore, since claim 10 is dependent upon claim 8, it should be allowed if the amended claim 8 is allowable.

5. Allowable subject matter:

Claims 4, 6, 13, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response:

The Applicant appreciates the allowance of claims 4, 6, 13, and 17. Therefore, claim 4 and its base claim 1 is rewritten as a new claim 19.

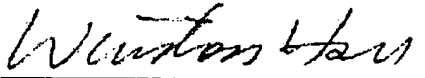
6. Introduction of new claims:

Claims 19-23 is introduced to include all the limitations of claim 1 and further describe the width of the first assist patterns is equal to the space between the first assist pattern and the first straight line, which is not disclosed in the cited references. No new matter is entered. Consideration of claims 19-23 is politely requested.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Respectfully submitted,



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- 10 Note: Please leave a message in my voice mail if you need to talk to me. The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.